/5 cont./

177 244 early as 1560 Alvarez de Almada speaks of the abundant harvests of mantiga eaten fresh by the Mandingue /Mandingo/. In 1840 a Paris chemist, Rousseau, discovered the wealth of oil in the groundnut. In 1841 the brig "Zénith" transported 70 metric tons of nuts to Rouen. Protêt and Faidherbe encouraged this crop, which, in the framework of the colonial economic system, progressed rapidly from the coast toward the interior, thanks to the possibilities of the natural environment.

● 132 From the Senegal River in the north to the Casamance in the south, the climate of the country changes by successive transitions from Sahelian characteristics to Sudanese aspects. A long dry season of nine months in the north, shorter in the south, from October or December to May-June, contrasts with a "winter season" of three to five months, depending on the region. The frequency and the importance of the precipitations increase from north to south. They go from 350 millimeters in the region of Louga to 1,200 millimeters in that of Ziguinchor. Whereas the coast is moistened by the humid trade wind, the Ferlo to the east is like a desert. These conditions are nearly /6/ ideal for a 244 plant whose vegetative cycle is short -- about 120 days -- and which germinates easily in a slightly moistened soil, develops under heavy rains, and bears fruit best during the dry days that follow.

134 244 The soil conditions also seem to be wholly favorable. The plant is not very demanding with respect to fertility; essentially it requires a light soil, because the fructification is underground. The silico-argillaceous soils of the center of Senegal (the dek of the Ouoloff /Wolof/) and the sandy soils of the north (the dior of the Ouoloff) suit the groundnut perfectly.

496 244 311 The expansion of the area of cultivation, from the coast and the estuaries toward the interior, has been led by the railroads. The Dakar--Saint-Louis railroad, built in 1885, explains the essential role of Cayor in groundnut production at the beginning of the century, since it was along the Dakar-Niger line, achieved in 1888, that the groundnut front progressed toward the east. Today this front, which in the south has broken into the

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/384 cont./
breeding-places of mosquitoes in the numerous swamps of the peninsula having been successfully undertaken by the federal authorities, one can better appreciate the exceptionally pleasant climate of Dakar, subject eight months of the year to the "influences of the Canaries" (cool and brisk current, marine trade-wind from the northeast), and an equilibrium tends to be established between men, women, and children, the first nevertheless still remaining the most numerous; in 1955, 39% men against 31% women and 30% children for the total non-African population; and 35% men, 30% women, and 35% children for the non-African population in residence. Among the Africans, one can verify the same phenomenon: 36% men, 31% women, and 35% children less than 14 years of age for the total population; 34% men, 31% women, and 35% children for the population in residence. Despite this tendency toward equilibrium, the fact remains that for the whole population of Dakar, men over 14 years of age are definitely more numerous than women over 14 years of age and than children; the balance sheet gives 37% for the men as against 30% for the women and 35% for the children.

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This situation is explained by the fact that immigration to Dakar is first of all of interest to the men, for whom it carries the hope of a better position, but it also represents a daring enterprise on which one does not take women and children until definite opportunities for settling down present themselves. This fact is particularly clear for the non-resident population, among whom the proportion of men is very high. Thus, among the non-resident Africans, there are 57% men as against 27% women and 16% children. The proportion is even higher among non-resident foreigners: 77% men as against 12% women and 11 % children.

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But though settling in Dakar is almost always linked to employment for the non-African population, it is not the same for Africans. The destruction of the villagers' traditional institutions, modern transportation, the facilities for hospitality

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4. CLIMATE

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Meteorological Stations mentioned in Text and Tables

	Latitude N.	Longitude W.	Altitude in feet
Podor	16° 35′	15° 02′	49
St. Louis	16° 01′	16° 30′	25
Matam	15° 38′	13° 13′	c. 70
Linguéré	15° 21′	15° 11′	c. 90
Bakel	14° 53′	12° 24′	c. 90
Thiès	14° 49′	16° 52′	207
Bambey	14° 40′	16° 25′	59
Dakar	14° 39′	17° 25′	105
Kaolack	14° 07′	16° 07′	17
Tambacounda	13° 45′	13° 39′	154
Kédougou	12° 33′	12° 10′	433
Ziguinchor	12° 32′	16° 21′	18

132 LIKE that of French Guinea, the colony's climatic year is divided into two distinct periods: a dry season from October to May, and a wet season from June to September. The former has north-east winds, generally clear skies, and a large range of temperature; and the latter, introduced by tornadoes, is more equable and has south-westerly winds, much cloud, and high humidity. Imposed upon this general pattern is the influence of the trade winds, which, in the dry season, keep the coast north of Dakar cooler and moister than the interior. The weeks immediately preceding the wet season are very oppressive.

Pressure (Fig. 58)

Senegal lies between the belts of northern tropical high pressure and equatorial low pressure. Although the movements of these two are very considerable during the course of a year, the local effect is negligible. Fig. 58 shows that surface pressure lies between 1012 mb. and 1014 mb. all the year, and that seasonal changes are concerned rather with the direction in which it decreases. The gradient in January is from north to south, but in July it is from south-west to north-east. Extreme variations are within 3 mb. on either side of the means.

TABLE I. *Mean Daily Pressure* (1000+*millibars*) *reduced to sea-level and corrected to* 32° *F. and latitude* 45°

Station	J.	F.	M.	A.	M.	J.	J.	A.	S.	O.	N.	D.	Year	Annual Range
St. Louis	13	12	11	11	10	11	13	11	11	11	11	13	11	3
Dakar	13	12	11	11	12	13	11	11	11	11	11	13	11	2
Kaolack	11	10	09	09	09	10	13	11	11	11	11	11	11	4
Ziguinchor	11	11	11	11	11	13	14	13	13	11	11	13	11	3

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There is a fairly regular diurnal range, amounting to 2 or 3 mb. near the coast and to 3 or 4 mb. inland. Maxima occur at about 10.00 a.m. and 10.00 p.m. and minima at about 4.00 a.m. and 4.00 p.m., the day extremes being the more marked. Irregular variations are infrequent and slight.

Winds (Fig. 50)

Surface Winds. As may be expected, there are two main winds: the north-easterlies and the monsoon. The former are composed of two distinct currents, the trades and the harmattan, and the difference between them has been explained on pp. 314–15. Each of the three currents brings different weather, according as the two systems swing north and south.

In January a strip of country some 40 miles wide along the coast north of Rufisque is under the trades, and the rest of the colony is covered by the harmattan. The monsoon does not appear. This state of affairs continues through February and March, but by April the monsoon is pushing north, and from that time until July the trades and harmattan retire before it. By August the monsoon, then at its strongest, covers the whole country. From September to January the monsoon is retreating and the trades and harmattan are re-establishing themselves.

None of the three currents is very strong or very deep. The annual means at most stations average from 2 to 4 m.p.h. The trades, however, are rather stronger and the annual means along the north-west coast are between 7 and 11 m.p.h., with speeds above the average in the north from January to March and below it from August to October. The mean speed of the harmattan is only about 4 m.p.h., and this fact is very evident in the quieter conditions that obtain when it intervenes in the trades and reaches the coast. The monsoon is also feeble, and, although many stations register their highest speeds as it advances, calms are frequent when it is established. It is always weaker on its northern edge than over the coast. Trades and harmattan are about 3,000 feet deep. The monsoon is the same along its northern border, but over the south in August it attains 6,000 feet. Winds of rather greater force may be met in the upper layers of all three currents.

When the seasonal wind is firmly established there is a fairly regular daily rhythm. Nights are calm except when the trades are blowing at their strongest. Winds are light in the early morning, and

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•132 rise to their maximum in the afternoon or evening. Along the coast sea- and land-breezes frequently alter the direction of the trades and the strength of the monsoon. At St. Louis, for instance, the land-breeze gives the trades a distinct easterly component in the morning, and during the day they are often north-westerly, being sucked inland from the sea. At Dakar observations from the north-east quadrant are, both for each month and for the year, higher at 7.00 a.m. than at 2.00 p.m. and those from the west at 2.00 p.m. than at 7.00 a.m. The land-breeze is the stronger in the dry season, the sea-breeze in the wet. The former strengthens the harmattan, the latter the monsoon.

Since tornadoes occur on the northern edge of the monsoon, the tornado season is from July to October over most of the colony, and the average number is about 20 per annum. In the Casamance Territory they are experienced as early as May. They are accompanied by intense lightning and thunder, and usually by torrential rain; but those which come after the wet season are often dry. Farther north they are less violent. Inland they blow up at any hour and always from the east; but on the coast they frequently occur at night and often move from south to north. The sea-breeze may prevent the formation of those cumulus clouds which are, in the interior, a normal feature of the day preceding a tornado.

Upper Winds. Above the sea- and land-breezes and the three surface currents are easterly winds, and above them again light westerlies. The boundary between the two last is always higher in the south.

During the dry season the upper surface of the easterlies lies above the trades or harmattan at a mean height of from 5,000 to 10,000 feet over the Senegal and about 15,000 feet over the Casamance. When the easterlies lie above the monsoon they extend to very great heights, at least 25,000 feet in the north and 30,000 feet in the south. There are, however, great diurnal and even hourly variations: at times the easterlies form only a very thin belt in the north, and on at least one occasion the westerlies have been noted directly above the trades over Dakar.

The easterlies are continental in origin and carry a dust haze, and for this reason it is difficult to define their base above the harmattan. By some meteorologists, indeed, they are considered to be the same current, but they may easily be distinguished from the other two surface winds. They are some 10°–15° warmer and 15–50 per cent. drier than the trades, but they are several degrees colder and drier

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than the upper surface of the monsoon. The speed of the easterlies is about 5–15 m.p.h. at their base and 15–25 m.p.h. in their higher levels. A shallow zone of calm air is often found along their junction with the monsoon. 132

Little is known about the westerlies, but at their base their temperature is several degrees lower and their relative humidity higher than

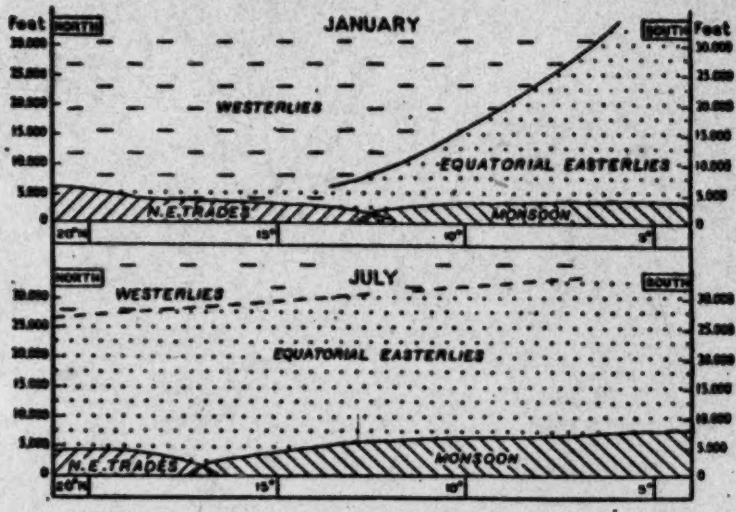

FIG. 50. *Vertical Distribution of Wind: Longitude 16° W.*

those of the top of the easterlies. Their speed is usually less than 15 m.p.h., but above 35,000 feet it is occasionally very much more.

Rainfall, Cloud, and Thunder

Rainfall (Fig. 59). Since rain is brought by the monsoon, the wet season in the south is longer and opens earlier. About one-third of the annual total falls in August. As a general rule, rain is heavier in the south and along the coast. In the north-east of the colony the year's total is received from a few isolated storms, but their effect on rivers, roads, and vegetation is much more pronounced in the interior. Except along the coast, where there is much at night, most rain falls in heavy showers during the afternoon. Amounts for any twenty-four hours may be heavy enough to dislocate communications, but even at the height of the season several fine days normally separate two wet ones.

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TABLE II. *Mean Rainfall*

R = Rainfall in inches. X = Maximum fall in 24 hours. D = Number of rain-days.

Station	For. dists.		Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Cape Manuel	1	R	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12
		X	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12
		D	1	0	0	0	0	0	0	0	0	0	0	0	1
Dakar	2	R	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12
		X	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12
		D	1	0	0	0	0	0	0	0	0	0	0	0	1
Rufisque	2	R	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12
		X	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12
		D	1	0	0	0	0	0	0	0	0	0	0	0	1
Thiès	2	R	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12
		X	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12
		D	1	0	0	0	0	0	0	0	0	0	0	0	1
Kaolack	2	R	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12
		X	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12
		D	1	0	0	0	0	0	0	0	0	0	0	0	1
Kaolack	2	R	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12
		X	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12
		D	1	0	0	0	0	0	0	0	0	0	0	0	1

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Mean figures should be used with reserve, for in Senegal, as in the rest of West Africa, variations are considerable. At St. Louis, for example, only 5 inches of rain fell in 1903, but there were 26 inches in 1912. At Dakar the 1937 total was 15 inches, but that of 1938 was 27 inches. The September fall of Tambacounda was 0·71 inch in 1937 and 9·45 inches in 1939. 132

Hail has been recorded in the colony, but quite irregularly.

Cloud. Although records are only available from stations near the coast, there is always more cloud in the south, and the monsoon brings a general increase. Since the amount of cloud is closely allied to the rainfall, the pall of cloud advances north from April and then retreats.

The mean for the dry season is 2 to 4 tenths of sky covered. The wet has 4 to 8 tenths in the north and 6 to 9 tenths in the south, with higher figures in the morning except along the southern coast. Nights are normally clear. The harmattan is almost cloudless both by day and night, but cirrus and alto-stratus often mark the base of the westerlies during the dry season. The trades usually carry light cumulus clouds by day, but only near the land. The monsoon cumulus, whose base lies at about 1,500 feet, is heavier. Rain falls from nimbus and cumulo-nimbus. At the height of the wet season in the south nights are occasionally as cloudy as days, but even then a uniformly overcast sky is uncommon.

A tendency to greater cloudiness has been noted in two areas: along the coast just south of Dakar and, during the monsoon, on the windward slopes of the northern spurs of Fouta Jalon.

Thunder. Thunderstorms are almost unknown in the dry season, and are rare at sea off the colony at any time of year. They occur during the rains, with a maximum between July and September. In the north there are from 25 to 30 per annum with about 8 in the worst month. They are more numerous in the south, and the annual total varies from 80 or 90 on the coast to 40 or 50 inland. The average for September, their worst month, is 10 at Tambacounda and 20 at Ziguinchor. The first and last storms are often dry, i.e. without rain falling on the ground. Along the coast thunder is associated with a tornado at night but not necessarily by day.

Temperature and Humidity

Throughout the year temperatures are high and rarely fall below 60°. In the dry season the cooler nights and lower humidity are not

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● 132 unpleasant, but the afternoons are hot. Between July and September the rainfall is sufficient to lower day temperatures except in the north-west. Nights, however, remain hot and the humidity rises, so that this season is most oppressive.

Temperature. Table III indicates clearly the essential points of the seasonal changes: the lower temperatures on the coast as compared with the same latitude inland; the single maxima at St. Louis and Dakar and the secondary rise after the rains at all other places; the greater diurnal range in the dry season; and the smaller seasonal changes in the south, especially on the coast.

The coolest hour is just before dawn and the hottest in mid-afternoon, and the average diurnal range in the dry season is some 25°–30°. Temperatures in the open may be as much as 20° higher or lower than screen figures. Irregular variations are rare, but rain and tornadoes cause an abrupt fall of several degrees, and along the coast when the sea-breeze takes the place of the harmattan temperatures may fall by a dozen degrees in as many minutes.

The level at which freezing-point is reached is rarely below 15,000 feet. Serious icing is only experienced in well-developed cumulo-nimbus clouds.

TABLE III. *Means of Daily Maximum and Minimum Temperatures*

Station	*J.*	*F.*	*M.*	*A.*	*M.*	*J.*	*J.*	*A.*	*S.*	*O.*	*N.*	*D.*	*Year*	*Annual Range*
St. Louis	85	85	83	77	79	86	89	90	91	89	88	85	86	14
	60	61	63	63	66	74	77	77	77	76	70	63	69	17
Linguère	95	97	100	107	110	107	99	92	93	97	95	93	99	18
	56	59	63	67	72	76	75	74	73	73	63	59	67	20
Dakar	82	83	82	80	82	88	88	87	88	88	87	83	85	8
	65	64	65	65	68	74	77	76	77	76	73	68	71	13
Kaolack	95	98	101	103	104	99	94	91	91	93	97	94	97	14
	61	63	65	66	71	76	75	75	74	73	67	64	69	15
Tambacounda	95	99	102	106	103	97	90	87	89	90	93	93	96	19
	59	61	67	70	76	74	72	72	72	72	63	59	68	17
Ziguinchor	91	94	96	96	95	91	88	85	87	89	90	87	91	11
	62	63	67	68	72	75	74	74	74	74	71	65	70	13

Humidity (Fig. 51). The figures of Table IV show no very great extremes, but both the highest, with the monsoon, and the lowest, with the harmattan, can be very distressing.

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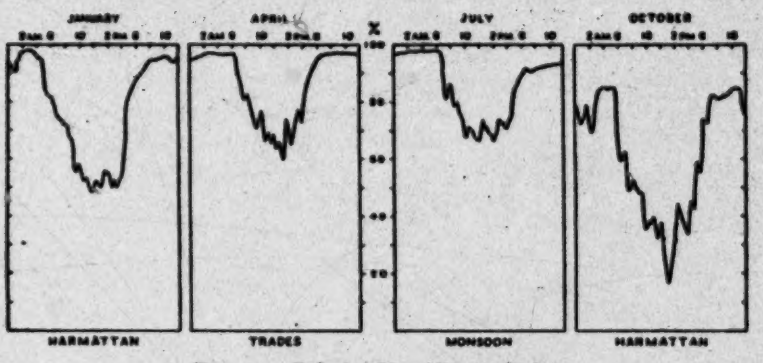

FIG. 51. *Relative Humidity at Dakar*

Relative humidity is always highest in the west and south. Variations from the mean are greatest during the dry season and in the interior. Along the coast the relative humidity rises noticeably in the afternoon, when the sea-breeze displaces the harmattan.

TABLE IV. *Mean Relative Humidity* (*percentages*)

Two observations: 8.00 a.m. and 6.00 p.m. Three: 8.00 a.m., 1.00 p.m., and 6.00 p.m.

Station	*J.*	*F.*	*M.*	*A.*	*M.*	*J.*	*J.*	*A.*	*S.*	*O.*	*N.*	*D.*	*Year*	*Annual Range*
St. Louis	59	68	76	87	82	81	81	85	85	82	66	60	76·0	26
	33	44	54	73	69	67	67	70	70	66	46	47	58·8	27
	55	63	68	79	75	74	71	74	73	74	66	61	69·4	24
Dakar	67	76	84	87	84	83	81	86	87	86	78	67	80·3	20
	43	45	53	58	59	63	67	73	72	67	51	44	58·0	30
	50	51	59	65	69	70	70	77	76	72	62	57	64·8	27
Kaolack	59	63	70	76	77	84	88	93	94	92	75	64	77·9	35
	33	29	30	34	43	54	67	79	76	67	43	30	49·5	50
Tambacounda	39	40	42	49	57	76	86	92	92	92	79	59	66·9	53
	16	16	16	16	28	47	65	76	74	70	47	31	41·8	60
Ziguinchor	75	82	86	86	87	90	93	96	96	94	87	77	87·6	21
	40	42	44	42	49	63	76	81	73	72	57	49	57·5	41
	42	44	46	52	56	65	81	86	81	76	63	57	62·4	44

Visibility

Annual means are from 9 to 11 miles at 8.00 a.m., from 12½ to 18 miles at 1.00 p.m., and from 12½ to 16½ miles at 6.00 p.m. with the higher figures in every case to the south. In general, visibility is best in the trades and monsoon and worst in the harmattan and easterlies. In the harmattan it is normally only from 2½ to 5 miles and may be less than 1 mile for several days on end. On the other

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132 hand, in September at Ziguinchor, for example, the midday mean rises as high as 48 miles, although at that time of year interference from cloud is greatest. Whatever the season, conditions are better at midday and in the evening than in the morning.

Temporary deterioration is caused by sand storms, fog, bush fires, and rain. The first occur during December and January over dunes such as those in Fouta and Ferlo. In them visibility may drop to less than 100 yards and the ensuing haze persists for several days over large areas. Fog is common before and after the rains and is to be expected over the southern estuaries at any time of the year when winds are light. It rarely extends above 500 feet or lasts after 9.00 a.m. Between February and April there is local interference from the smoke of bush fires, which rises 2,000 or 3,000 feet. In the wet season heavy rain naturally causes temporary deterioration. At this season also low cloud often blots out the tops of the spurs of Fouta Jalon.

Swell and Surf

133 Details of swell at Dakar are given in Appendix II, and they may be taken as typical of conditions along the whole of the coast of the colony. On beaches farther north there is slightly more north-westerly swell and on those to the south rather more from the south-west. Heavy seas are rare.

Surf, on the other hand, is everywhere heavy. On exposed beaches south of Cape Verde, for instance, rollers sometimes curl in 30 feet of water and break in a depth of 10 feet. Surf is especially dangerous at the mouths of estuaries when a strong ebb-tide is running.

Meteorological Services

654 Dakar is the chief meteorological station in French West Africa, and St. Louis, Tambacounda, and Ziguinchor are also fully equipped for recording both surface and upper air conditions. Their reports [207] are included in the synoptic broadcasts from Dakar, which cover the whole of the west coast. Secondary stations are at Bambey, Kaolack, Linguéré, Podor, and Thiès, whose reports are also included. Twenty-six other places record rainfall.

5. VEGETATION

137 Most of the colony falls within two of the main vegetation zones. To the north is the thornland, while to the south the zone of grass-woodland has two subzones, the Sudan and the Guinea, and

/100 cont./

SR 105 [613] master. The order of succession to the throne was governed by immutable rules. The Grand Diaraff chose the Bour, while being bound to take him from the princely caste of the Guelwars and from the maternal line. The title of Queen, or Linguère, was borne, not by the wife of the Bour, but by his mother.

S 132 Climate. Soil. The climate of Sine-Saloum is very hot and dry. It is painful for the European. The thermometer never drops below 12° centigrade at night. During the day it sometimes climbs up to 45° and even 48°. The thermic average is from 28° to 30°. Two seasons sharply contrast: the dry season, which lasts from November to June and during which the east wind, searing and drying, blows; the rainy season or winter, which runs from June to November, an unhealthy period when swamp fever prevails. The atmospheric precipitation is plentiful. It drops on the average one to 1.20 meters of water. This is very little compared to the figures for Lower Guinea (four to five meters); it is less than in Casamance where the annual rainfall is two meters. But the rate of rainfall here is higher than in all the rest of Senegal. At Dakar and Saint-Louis, for example, from 0.45 to 0.55 meters of water falls.

S 133 312 [134] The soil is generally permeable. In certain places drinking water is reached at a shallow depth. By contrast, in other places it is necessary to dig very deep wells. At Fatick, the surface layer of fresh water is at two and a half or three meters. At Kaolack, it is necessary to go more than ten meters, although in some years water has been found at six meters. At Gossas, a deprived area, it has been necessary to dig as far as 90 meters; at Guinguinéo, /map appears here/ /101/ wells are 60 meters deep. It is fitting to mention, as a curious fact, the presence of fresh water on the edge of the marigots of salt water. For example, at Dangana (Sine), the well of the encampment, which is dug one meter from the edge of the river bank and to a depth of 1.5 meters, contains potable water which the inhabitants use.

S 134 The soil is not very rich in humus. It is sandy in the north and silico-argillaceous in the other areas, but very nearly